

## PATENT ABSTRACTS OF JAPAN

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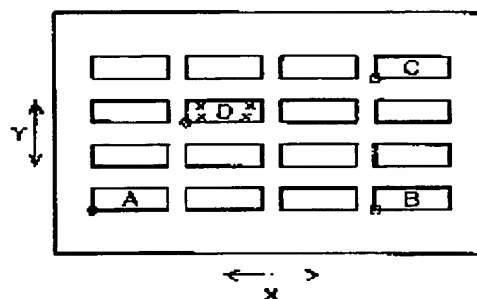
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## (54) PRINTED MATTER EVALUATOR

(57)Abstract:

**PURPOSE:** To make possible the assigning of the measuring point of each surface of a multiple layout printed matter accurately with a simple structure by inputting coordinates of a reference point on any reference surface among a plurality of surfaces and those of a measuring point.

**CONSTITUTION:** Coordinates of a reference point on any one reference surface of a multiple layout printed matter and those of a measuring point for evaluation are inputted and the coordinates of the reference points on the remaining surfaces are determined on the basis of coordinates of the reference point on the reference surface and an array rule of a picture pattern. For example, an angle at a left lower corner of three corners among four corners in an  $4 \times 4$  array of picture pattern surfaces, namely, three surfaces A, B and C are inputted in coordinates as reference point. The point of the angle of the corner of the picture pattern can be inputted in coordinates accurately by an inspecting person to achieve a higher position accuracy. Moreover, the reference point of the reference surface D is inputted. Thus, the reference points on other surfaces can be learned on the basis of the reference points on the plurality of surfaces and a rule of array. Thereafter, when coordinates of the measuring point (X mark) of the reference surface D are inputted, the coordinates of a relative measuring point can be obtained with respect to reference points on the surfaces A, B and C.



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## CLAIMS

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### [Claim(s)]

[Claim 1] In the print assessment equipment for multiple attachment prints with which the pattern same in the print of one sheet is regularly arranged by two or more pages A means to input said coordinate of a reference point [ in / two or more / one datum level of the fields ], and the coordinate of point of measurement, A means to search for the coordinate of the reference point in the remaining fields other than said datum level based on a means to measure the printing condition of the point of measurement of said datum level, and the coordinate of the reference point of said datum level and the array regulation of a pattern, A means to search for the coordinate of the point of measurement in the remaining fields other than said datum level based on the relative coordinate of the point of measurement to the reference point in said datum level, and the coordinate of the point corresponding to the reference point of the field concerned, Print assessment equipment characterized by measuring the printing condition of said point of measurement in the remaining fields other than said datum level, and providing the means in comparison with the measurement result of the printing condition of the point of measurement of said datum level.

[Claim 2] In the print assessment equipment for multiple attachment prints with which the pattern same in the print of one sheet is regularly arranged by two or more pages A means to input the coordinate of said coordinate of a reference point [ in / two or more / one datum level of the fields ] and point of measurement of the criteria print of one sheet, A means to search for the coordinate of the reference point in the remaining fields other than said datum level based on a means to measure the printing condition of the point of measurement of said datum level, and the coordinate of the reference point of said datum level and the array regulation of a pattern, A means to search for the coordinate of the point of measurement in the remaining fields other than said datum level based on the relative coordinate of the point of measurement to the reference point in said datum level, and the coordinate of the reference point of the field concerned, Print assessment equipment characterized by measuring the printing condition of said point of measurement in each field of the print of each \*\*, and providing the means in comparison with the measurement result of the printing condition of the point of measurement of said datum level.

[Claim 3] A pattern with said same multiple attachment print a means for it to be arranged regularly in all directions and to search for the coordinate of said reference point A means to input the coordinate of the reference point in two fields of the ends on the diagonal line of the array of a pattern side, Print assessment equipment according to claim 1 or 2 characterized by providing a means to search for the coordinate of the reference point in the remaining fields based on the coordinate of the reference point of two pattern sides and the array regulation of a pattern of having been inputted by said input means.

[Claim 4] A pattern with said same multiple attachment print a means for it to be arranged regularly in all directions and to search for the coordinate of said reference point A means to input the coordinate of the reference point in the field of three corners in four corners of the array of a pattern side, Print assessment equipment according to claim 1 or 2 characterized by providing a means to search for the coordinate of the reference point in the remaining fields

based on the coordinate of the reference point of three pattern sides and the array regulation of a pattern of having been inputted by said input means.

[Claim 5] Said reference point is print assessment equipment given in any 1 term of claim 1 characterized by being one of the four corners of a pattern side thru/or claim 4.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention measures the color of a multiple attachment print with two or more same patterns as the print of one sheet, or concentration, and relates to the print assessment equipment by which a print is evaluated. Print assessment equipment characterized by measuring the printing condition of the point corresponding to said point of measurement in each side of the print of each \*\*, and providing the means in comparison with the measurement result of the printing condition of the point of measurement of said datum level.

[0002]

[Description of the Prior Art] Decision whether the print is conventionally finished to the predetermined color which a customer specifies, or concentration was visually performed by the special tester. This decision was subjective, and since visual criteria changed with testers, objective decision was not completed. For this reason, it is not avoided that the variation in a color and concentration arises in the print printed by the large quantity, but when this variation is large, a complaint is brought near and it also becomes the situation of redo of printing from a customer.

[0003] Then, it considers evaluating a color and concentration objective using a measuring instrument. Generally, measuring instruments, such as a concentration meter and a colorimeter, are manually hit against a print by viewing, and the concentration of each point, a color, etc. are measured. Positioning of point of measurement is performed using the cross-joint crossover line (dragonfly) in the aperture of a measuring instrument etc. However, by the approach a tester specifies point of measurement manually in this way, the same point cannot be specified as accuracy in each side of the print of multiple attachment. Therefore, in the part in which gradation, such as a person, clothes, and a vehicle, starts and a big difference comes also out of a gap of a slight location to a measurement result, location precision does not come out but the solid section or the Taira mesh part of a print etc. has the fault which dispersion produces in measurement data, although the part out of which a difference does not come to a measurement result is satisfactory even if a location shifts somewhat.

[0004] In order to avoid this, how to measure, after carrying out the coordinate input of the point of measurement beforehand using an X-Y stage can be considered. However, in order to apply to assessment of printing of this approach of each side of a multiple attachment print and to measure the same point of each field, the coordinate input of all points must be performed. For this reason, the distance from the zero of an X-Y stage to each point of measurement must be measured. This cannot take time and effort dramatically and cannot measure point of measurement to accuracy in the gradation section. Therefore, this approach is not an approach that it is effective only in-the chart measurement which can measure comparatively easily, and it is suitable although a pattern is measured.

[0005]

[Problem(s) to be Solved by the Invention] Thus, when the point of measurement of each field of a multiple attachment print was compared and the former estimated the result condition of a print, there was a fault that the location precision of point of measurement was bad. It is offering

the print assessment equipment which can compare correctly the printing condition of the points which this invention's was made the situation mentioned above being coped with, and the object's can specify the point which is in the same location of each side in a multiple attachment print of corresponding with a sufficient precision with an easy configuration, and correspond between fields.

[0006]

[Means for Solving the Problem] In the print assessment equipment for multiple attachment prints with which the pattern with this invention same in the print of one sheet is regularly arranged by two or more pages A means to input the coordinate of a reference point and the coordinate of point of measurement in one datum level of two or more pages, A means to search for the coordinate of the reference point in the remaining fields other than datum level based on a means to measure the printing condition of the point of measurement of datum level, and the coordinate of the reference point of datum level and the array regulation of a pattern, A means to search for the coordinate of the point of measurement in the remaining fields other than datum level based on the relative coordinate of the point of measurement to the reference point in datum level, and the coordinate of the reference point of the field concerned, The printing condition of the point of measurement in the remaining fields other than datum level is measured, and it is characterized by providing the means in comparison with the measurement result of the printing condition of the point of measurement of datum level.

[0007] Moreover, this invention is set to the print assessment equipment for multiple attachment prints with which the pattern same in the print of one sheet is regularly arranged by two or more pages. A means to input the coordinate of said coordinate of a reference point [ in / two or more / one datum level of the fields ] and point of measurement of the criteria print of one sheet, A means to search for the coordinate of the reference point in the remaining fields other than datum level based on a means to measure the printing condition of the point of measurement of datum level, and the coordinate of the reference point of datum level and the array regulation of a pattern, A means to search for the coordinate of the point of measurement in the remaining fields other than datum level based on the relative coordinate of the point of measurement to the reference point in datum level, and the coordinate of the reference point of the field concerned, The printing condition of the point of measurement in each field of the print of each \*\* is measured, and it is characterized by providing the means in comparison with the measurement result of the printing condition of the point of measurement of datum level.

[0008] Here, a means to search for the coordinate of a reference point is characterized by providing a means to search for the coordinate of the reference point in the remaining fields based on a means to input the coordinate of the reference point in two fields of the ends on the diagonal line of the array of a pattern side, and the coordinate of the reference point of these two pattern sides and the array regulation of a pattern.

[0009] Moreover, a means to search for the coordinate of a reference point is characterized by providing a means to search for the coordinate of the reference point in the remaining fields based on a means to input the coordinate of the reference point in the field of three corners in four corners of the array of a pattern side, and the coordinate of the reference point of these three pattern sides and the array regulation of a pattern. Furthermore, it is characterized by a reference point being one of the four corners of a pattern side.

[0010]

[Function] According to the print assessment equipment by this invention, in any one datum level of the multiple attachment print, the coordinate of a reference point and the coordinate of the point of measurement for assessment are inputted, the coordinate of the reference point in the remaining fields can be searched for based on the coordinate of the reference point of datum level, and the array regulation of a pattern, and the coordinate of the point of measurement in the remaining fields can be searched for according to the relative coordinate over the reference point of point of measurement, and the coordinate of the reference point of each field. For this reason, the printing condition of the point of corresponding which is in the same location of each side in a multiple attachment print with an easy configuration can be measured with a sufficient precision.

[0011]

[Example] Hereafter, with reference to a drawing, the 1st example of the print assessment equipment by this invention is explained. Drawing 1 is the schematic diagram showing the whole 1st example configuration. Some are leaned to a vertical plane so that a soffit may serve as a near side, and the manuscript base 12 for laying the multiple attachment print 10 is formed. The reliance members 14 and 16 for positioning a print 10 are formed in the soffit of the manuscript base 12, and the left right end. Although not illustrated, a print 10 is drawn close by the manuscript base 12 by the Ayr adsorption, and is fixed.

[0012] on the manuscript base 12, the X-Y arm 18 movable free prepares in the direction of X, and the direction of Y -- having -- an arm 18 -- the colorimeter of a stimulus value direct reading type, or a spectrum -- a colorimetry-type spectrum -- the colorimeters 20, such as a colorimeter, are attached. The arm 18 is movable also by hand control while it is automatically movable according to a control signal. For this reason, it is [ colorimeter / 20 ] measurable in the color of the location of the arbitration on a print 10. A colorimeter 20 outputs the color of a print 10 as a color value by which numeric representation was carried out by various kinds of color coordinate systems.

[0013] The input carbon button 26 for assignment, such as the ball-point 24 for inscribing the location of point of measurement, point of measurement, and an origin/datum, is also attached on a print at an arm 18 besides colorimeter 20. The control panel 28 which consists of various actuation keys is formed beside the manuscript base 12.

[0014] The personal computer 32 as a controller is formed separately independently [ the body 30 which consists of the above elements ]. A personal computer 32 also contains a monitor 34, a keyboard 36, and a printer 38.

[0015] Next, actuation of this example is explained. Generally, in printing, before performing actual printing, a criteria sample is printed, and the color of actual printing is adjusted on the basis of this. Here, since a print is a multiple attachment print with which the pattern same in the print of one sheet is regularly arranged by two or more pages, the colorimetry value of the point that this criteria pattern side and each side of other prints correspond on the basis of a certain pattern side in it is compared. As a criteria sample, there is a proof [ finishing / revision of a customer ], a print which performed printing actual under a customer's presence and acquired the approval of a customer, or a print which the skilled tester checked. And if a criteria sample becomes settled, it will be laid on the manuscript base 12. A print 10 is laid so that the reliance members 14 and 16 may be contacted, it starts the Ayr attraction after that, and is made to fix it to the manuscript base 12. If the printing position of the pattern to a form is fixed, the location of the print to the manuscript base 12 will be decided by the contact to these reliance members 14 and 16.

[0016] Then, in order to measure the color of the specifying point within the criteria pattern side in a criteria sample, the coordinate of a specifying point is inputted. Since the multiple attachment print has been applicable in this invention, in order to compare and evaluate the criteria pattern side of a criteria sample, and each field of each sample here, the coordinate of the point of measurement in the remaining fields other than a criteria pattern side is also required.

[0017] However, since it is impossible to input the coordinate of the same point of measurement in detail in all fields as explained in the conventional technique, in this invention, the coordinate of point of measurement makes unnecessary the input of the point of measurement in each field by expressing with the system of coordinates to which location precision, such as either of four corners, makes a high reference point a zero in each side rather than expressing with the system of coordinates of the X-Y arm 18. That is, if the coordinate of the same point (reference point) in each field and the relative coordinate of the point of measurement to the reference point in datum level are known, the coordinate of the point of measurement of each point will be searched for. Here, in a multiple attachment print, although the coordinate of the reference point of each field, such as either of four corners, may be inputted in detail, since the array of a field follows the predetermined regulation, if the coordinate of a reference point is inputted only about a certain field, the coordinate of the reference point about the remaining fields can also be

searched for by the operation according to the regulation of the array of a field. In addition, it is better to input a reference point about several pages, if the effect of torsion of the form in the case of printing is taken into consideration.

[0018] Therefore, in this example, as shown in drawing 2, a coordinate input is carried out three corners in the four corners of the array of the pattern side of 4x4, and here, using the angle (O mark among drawing) of the lower left, the lower right, and the lower left corner of three upper right fields A, B, and C as a reference point. A tester can do a coordinate input correctly and the point of the angle of the corner of a pattern is a point that location precision is high.

Furthermore, the reference point of datum level D is also inputted in this example. In addition, when the number of arrays of the direction of X is 1, it is not necessary to input the reference point of the Ath page (when datum level D and Fields B and C are in the same train). Similarly, when the number of arrays of the direction of Y is 1, it is not necessary to input the reference point of C side (when datum level D and Fields A and B are in the same line). The coordinate of the reference point of other fields can be known from the reference point of such two or more fields, and the regulation of an array. Then, if the coordinate of the point of measurement (x mark among drawing) in datum level D is inputted, the coordinate of the relative point of measurement to the reference point of each field can be acquired.

[0019] In addition, in the case of the multiple attachment print with which the pattern side as shown in drawing 3 has not aligned in X and the direction of Y, it is desirable to input the reference point of all fields. Assignment of point of measurement may specify two or more points uniformly over the whole print surface, and may specify them as parts (female skin etc.) to double a color carefully especially preponderantly. Assignment of point of measurement doubles with point of measurement the intersection of the cross-joint crossover line (dragonfly) in the aperture which is prepared in the colorimeter 20 and which is not illustrated, and is performed by pushing the input carbon button 26. A criteria sample will be measured if these inputs are completed. That is, the X-Y arm 18 moves according to the coordinate of point of measurement, and the colorimetry value of each point is inputted. Measured value is inputted into a personal computer 32 with the coordinate of point of measurement. Moreover, while point of measurement is inscribed with a ball-point 24 on the datum plane of a criteria sample, the location of the point of measurement on a print is displayed on a monitor 34. It is displayed as an ordinal number which shows a point of what position point of measurement is. in addition -- as a colorimeter 20 -- a handicap type -- a spectrum -- the thing in which a colorimetry is possible is used.

[0020] There are the following various things as a color coordinate system which expresses a color numerically.  $L^* a^* b^*$  which Commission Internationale de l'Eclairage (CIE) specified There is Munsell color system which consists of a color coordinate system (it is also called a CIELAB system), an  $L^* C^* h$  color coordinate system, a hunter Lab color coordinate system, a XYZ (Yxy) color coordinate system, a hue (H), lightness (V), and saturation (C). Although any color coordinate system may be used, a CIELab system suits human being's appearance well, and since it is the most popular, this is used here. Namely,  $L^*$  of each specifying point A value and  $a^*$  A value and  $b^*$  A value is inputted into a personal computer 32 as a certified value of the color value of each specifying point. It is the chromaticity which shows  $L^*$ , a hue, and saturation for lightness by the CIELab system  $a^*$  and  $b^*$  It expresses.  $a^*$  and  $b^*$  The direction of a color is shown and it is  $a^*$ . The direction of red, and  $-a^*$  The green direction and  $b^*$  The direction of yellow, and  $-b^*$  The direction of blue is shown. It becomes the color which was somber as the color became vivid as the numeric value became large, and the lead was taken. in addition, saturation -- one  $(a^{*2}+b^{*2})$  half it is .

[0021] Actual printing is started, and if the print of the stable color comes to be obtained, sampling inspection of a print will be conducted. One sampling inspection is performed for example, in the 1000 sections. Measurement sets a print to a manuscript base and inputs the coordinate of the reference point of several pages like the case of a criteria sample. Thereby, the coordinate of the reference point of each side is searched for, and the coordinate of the point of measurement of each side is searched for. Then, the point of measurement of each side is measured like criteria sample measurement. Measurement data is inputted into a personal computer 32. It is judged whether the color difference of the color value of each point of



measurement of each side and the certified value of datum level is below a predetermined allowed value, and assessment of a color is performed according to a judgment result. The color difference is defined as follows.

[0022]

color difference ( $\Delta E$ ) =  $(\Delta L^*^2 + \Delta a^*^2 + \Delta b^*^2)^{1/2}$  -- here --  $\Delta L^*$  -- the lightness difference of a criteria print and the print for assessment,  $\Delta a^*$ , and  $\Delta b^*$  It is the chromaticity difference of a criteria print and the print for assessment.

[0023] Thus, by carrying out color assessment using the color difference measured by the colorimeter 20, whether the color of a actual print is how much separated with the color of criteria can grasp quantitatively. In addition, an allowed value may not be a fixed value to no colors. Generally, since human being's eyes have equal sensibility to not all colors, even if the color difference differs only in the same numeric value, the method of sensibility changes with colors. That is, although the color difference with slight flesh color, gray, etc. is also recognized, even if the color difference changes considerably, for human being's eyes, the color of a pure-color system, for example, yellow etc., is hardly recognized. For this reason, if the allowed value which serves as criteria of color assessment by the color is changed, the judgment suitable for human being's valuation basis can be performed. For example,  $a^*$   $b^*$  of  $L^* = 50$  of CIELAB space A field top is divided in the saturation direction and the direction of a hue to two or more fields, the allowed value of the color difference is decided for every field, and the colors (gray, flesh color, etc.) which sense sense of incongruity for human being's eyes also only by a color being slightly different are judged severely, and they constitute the color (pure-color system) which is not so so that it may judge loosely.

[0024] As explained above, according to this example, in any one datum level of the multiple attachment print, the coordinate of the reference point where location precision, such as any 1 corner of four corners, is high, and the coordinate of the point of measurement for assessment are inputted. Since the coordinate of the reference point in the remaining fields is searched for based on the coordinate of the reference point of some fields, and the array regulation of a pattern and the coordinate of the point of measurement in the remaining fields is searched for according to the relative coordinate over the reference point of point of measurement, and the coordinate of the reference point of each field The printing condition of the point of corresponding which is in the same location of each side in a multiple attachment print with an easy configuration can be measured with a sufficient precision.

[0025] This invention cannot be limited to the example mentioned above, but can deform variously, and can be carried out. For example, although above-mentioned explanation is related with the example which performs comparative evaluation of the datum level of a criteria sample, and each side of each print, also when performing comparative evaluation of the datum level for every sample, and the remaining fields, it can be applied. Moreover, although assessment was performed based on the color difference, you may compare for every lightness, saturation, and hue. Although the point of four corners was used as an origin/datum of each side of a print, the dragonfly mark is printed in the margin section for every pattern side, and this may be used as an origin/datum. Furthermore, the field of not only the field of a corner but predetermined arbitration is sufficient as the field which inputs a reference point.

[0026]

[Effect of the Invention] according to [ as explained above ] this invention -- the condition as datum level that each field of a multiple attachment print is the same -- finish -- \*\*\*\* -- in order to evaluate objective whether it is, in the print assessment equipment which measures the printing condition of a point [ / side / each ], the point of measurement of each field can be specified with a sufficient precision with an easy configuration.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The block diagram showing the configuration of the 1st example of the print assessment equipment by this invention.

[Drawing 2] Drawing showing an example of a multiple attachment print.

[Drawing 3] Drawing showing other examples of a multiple attachment print.

[Description of Notations]

10 [ -- A X-Y arm, 20 / -- A colorimeter, 24 / -- A ball-point, 26 / -- An input carbon button, 28 / -- A control panel, 30 / -- A body, 32 / -- Personal computer. ] -- A print, 12 -- 14 A manuscript base, 16 -- A reliance member, 18

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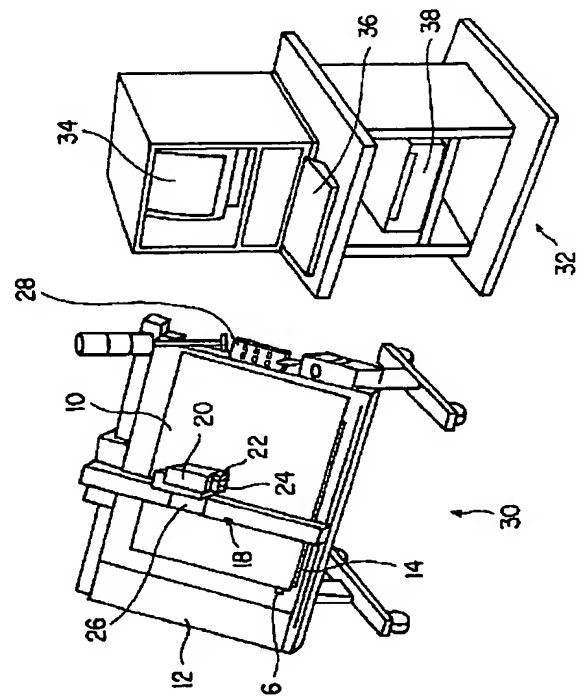
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(54) 【発明の名称】 印刷物評価装置

(57) 【要約】

【目的】 本発明は多面付け印刷物の各面が基準面と同じ状態に仕上がっているかを評価するために、各面の対応する点の印刷状態を測定する印刷物評価装置において、各面の測定点を簡単な構成で正確に指定することを目的とする。

【構成】 基準面Dにおける基準点の座標と測定点の座標とを入力し、絵柄面の配列における四隅のうちのいずれか3つの面A、B、Cの面の基準点の座標を入力し、これらの3面の基準点の座標と絵柄の配列規則とに基づいて残りの面における基準点の座標を求め、基準面における基準点に対する測定点の相対座標と当該面の基準点の座標とに基づいて基準面以外の残りの面における測定点の座標を求め、基準面と他の面との測定点の印刷状態を比較する。



## 【特許請求の範囲】

【請求項 1】 1 枚の印刷物中に同一の絵柄が規則的に複数面に配列されている多面付け印刷物用の印刷物評価装置において、

前記複数面のいずれかの基準面における基準点の座標と測定点の座標とを入力する手段と、

前記基準面の測定点の印刷状態を測定する手段と、

前記基準面の基準点の座標と絵柄の配列規則とに基づいて前記基準面以外の残りの面における基準点の座標を求める手段と、

前記基準面における基準点に対する測定点の相対座標と当該面の基準点に対応する点の座標とに基づいて前記基準面以外の残りの面における測定点の座標を求める手段と、

前記基準面以外の残りの面における前記測定点の印刷状態を測定し、前記基準面の測定点の印刷状態の測定結果と比較する手段とを具備することを特徴とする印刷物評価装置。

【請求項 2】 1 枚の印刷物中に同一の絵柄が規則的に複数面に配列されている多面付け印刷物用の印刷物評価装置において、

1 枚の基準印刷物の前記複数面のいずれかの基準面における基準点の座標と測定点の座標とを入力する手段と、

前記基準面の測定点の印刷状態を測定する手段と、

前記基準面の基準点の座標と絵柄の配列規則とに基づいて前記基準面以外の残りの面における基準点の座標を求める手段と、

前記基準面における基準点に対する測定点の相対座標と当該面の基準点の座標とに基づいて前記基準面以外の残りの面における測定点の座標を求める手段と、

各枚の印刷物の各面における前記測定点の印刷状態を測定し、前記基準面の測定点の印刷状態の測定結果と比較する手段とを具備することを特徴とする印刷物評価装置。

【請求項 3】 前記多面付け印刷物は同一の絵柄が縦横に規則的に配列されており、

前記基準点の座標を求める手段は、

絵柄面の配列の対角線上の両端の 2 つの面における基準点の座標を入力する手段と、

前記入力手段により入力された 2 つの絵柄面の基準点の座標と絵柄の配列規則とに基づいて残りの面における基準点の座標を求める手段とを具備することを特徴とする請求項 1 または請求項 2 に記載の印刷物評価装置。

【請求項 4】 前記多面付け印刷物は同一の絵柄が縦横に規則的に配列されており、

前記基準点の座標を求める手段は、

絵柄面の配列の 4 隅のうちの 3 つの隅の面における基準点の座標を入力する手段と、

前記入力手段により入力された 3 つの絵柄面の基準点の座標と絵柄の配列規則とに基づいて残りの面における基

準点の座標を求める手段とを具備することを特徴とする請求項 1 または請求項 2 に記載の印刷物評価装置。

【請求項 5】 前記基準点は絵柄面の四隅の 1 つであることを特徴とする請求項 1 乃至請求項 4 のいずれか一項に記載の印刷物評価装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は 1 枚の印刷物に同じ絵柄が複数ある多面付け印刷物の色、または濃度を測定し、印刷物を評価する印刷物評価装置に関する。各枚の印刷物の各面における前記測定点に対応する点の印刷状態を測定し、前記基準面の測定点の印刷状態の測定結果と比較する手段とを具備することを特徴とする印刷物評価装置。

【0002】

【従来の技術】従来、印刷物が顧客の指定する所定の色、または濃度に仕上がっているか否かの判断は、専門の検査者により目視で行なわれていた。この判断は主観的であり、検査者により目視基準が異なるので、客観的な判断ができなかった。このため、大量に印刷された印刷物中に色、濃度のバラツキが生じることが避けられず、このバラツキが大きい場合には、顧客から苦情が寄せられ、印刷のやり直しという事態にもなる。

【0003】そこで、計測器を利用して客観的に色、濃度を評価することが考えられている。一般的には、濃度計、測色計等の測定器を目視により手動で印刷物にあてて、各点の濃度、色等を測定する。測定点の位置決めは測定器のアパーチャにある十字交差線（トンボ）等を使用して行なっている。しかし、このように検査者が手動で測定点を指定する方法では、多面付けの印刷物の各面において同じ点を正確に指定することができない。そのため、印刷物のベタ部、あるいは平網部等、多少位置がずれても測定結果に差が出ない部分は問題が無いが、人物、洋服、車等グラデーションがかかり僅かの位置のずれでも測定結果に大きな差が出る部分では、位置精度が出ず、測定データにばらつきが生じる欠点がある。

【0004】これを回避するために、X-Y ステージを使用して予め測定点を座標入力してから測定を行なう方法が考えられる。しかし、この方法を多面付け印刷物の各面の印刷の評価に適用し、各面の同じ点を測定するには、全部の点の座標入力を行なわなければならない。このため、X-Y ステージの原点から各測定点までの距離を採寸しなければならない。これは、非常に手間がかかるし、グラデーション部等では正確に測定点を採寸することができない。したがって、本方法は比較的簡単に採寸を行なうことができるチャート測定のみ有効であり、絵柄を測定するには、適当な方法ではない。

【0005】

【発明が解決しようとする課題】このように従来では、多面付け印刷物の各面の測定点どうしを比較して印刷物

の仕上がり状態を評価する際に、測定点の位置精度が悪くという欠点があった。本発明は上述した事情に対処すべくなされたもので、その目的は、多面付け印刷物において各面の同じ位置にある対応する点を簡単な構成で精度良く指定でき、面間に対応する点どうしの印刷状態を正しく比較することができる印刷物評価装置を提供することである。

【0006】

【課題を解決するための手段】本発明は、1枚の印刷物中に同一の絵柄が規則的に複数面に配列されている多面付け印刷物用の印刷物評価装置において、複数面のいずれかの基準面における基準点の座標と測定点の座標とを入力する手段と、基準面の測定点の印刷状態を測定する手段と、基準面の基準点の座標と絵柄の配列規則とに基づいて基準面以外の残りの面における基準点の座標を求める手段と、基準面における基準点に対する測定点の相対座標と当該面の基準点の座標とに基づいて基準面以外の残りの面における測定点の座標を求める手段と、基準面以外の残りの面における測定点の印刷状態を測定し、基準面の測定点の印刷状態の測定結果と比較する手段とを具備することを特徴とするものである。

【0007】また、本発明は1枚の印刷物中に同一の絵柄が規則的に複数面に配列されている多面付け印刷物用の印刷物評価装置において、1枚の基準印刷物の前記複数面のいずれかの基準面における基準点の座標と測定点の座標とを入力する手段と、基準面の測定点の印刷状態を測定する手段と、基準面の基準点の座標と絵柄の配列規則とに基づいて基準面以外の残りの面における基準点の座標を求める手段と、基準面における基準点に対する測定点の相対座標と当該面の基準点の座標とに基づいて基準面以外の残りの面における測定点の座標を求める手段と、各枚の印刷物の各面における測定点の印刷状態を測定し、基準面の測定点の印刷状態の測定結果と比較する手段とを具備することを特徴とするものである。

【0008】ここで、基準点の座標を求める手段は、絵柄面の配列の対角線上の両端の2つの面における基準点の座標を入力する手段と、この2つの絵柄面の基準点の座標と絵柄の配列規則とに基づいて残りの面における基準点の座標を求める手段とを具備することを特徴とするものである。

【0009】また、基準点の座標を求める手段は、絵柄面の配列の4隅のうちの3つの隅の面における基準点の座標を入力する手段と、この3つの絵柄面の基準点の座標と絵柄の配列規則とに基づいて残りの面における基準点の座標を求める手段とを具備することを特徴とするものである。さらに、基準点は絵柄面の4隅の1つであることを特徴とするものである。

【0010】

【作用】本発明による印刷物評価装置によれば、多面付け印刷物のいずれか1つの基準面において基準点の座標

と評価のための測定点の座標を入力し、残りの面における基準点の座標は基準面の基準点の座標と絵柄の配列規則とに基づいて求め、残りの面における測定点の座標は測定点の基準点に対する相対座標と各面の基準点の座標とに応じて求めることができる。このため、簡単な構成で多面付け印刷物において各面の同じ位置にある対応する点の印刷状態を精度良く測定することができる。

【0011】

【実施例】以下、図面を参照して本発明による印刷物評価装置の第1実施例を説明する。図1は第1実施例の全体構成を示す概略図である。下端が手前側となるように鉛直面に対して多少傾けられ、多面付け印刷物10を載置するための原稿台12が設けられている。原稿台12の下端、左右端には印刷物10を位置決めするための、当て部材14、16が設けられている。図示していないが、印刷物10はエア吸着により原稿台12に吸い寄せられ、固定される。

【0012】原稿台12上にはX方向、Y方向に自在に移動可能なX-Yアーム18が設けられ、アーム18には刺激値直読式の色彩計、または分光測色式の分光測色計等の測色計20が取り付けられる。アーム18は制御信号に応じて自動的に移動可能であるとともに、手動によっても移動可能である。このため、測色計20は印刷物10上の任意の位置の色を測定可能である。測色計20は印刷物10の色を各種の表色系で数値表現された色彩値として出力する。

【0013】アーム18には測色計20以外にも印刷物上に測定点の位置を印すためのボールペン24、測定点、基準点等の指定のための入力ボタン26も取り付けられる。原稿台12の横には種々の操作キーからなる操作パネル28が設けられる。

【0014】以上の要素から構成される本体30とは別にコントローラとしてのパーソナルコンピュータ32が別途設けられる。パーソナルコンピュータ32はモニタ34、キーボード36、プリンタ38も含む。

【0015】次に、本実施例の動作を説明する。一般に印刷においては、実際の印刷を行なう前に基準サンプルを印刷し、これを基準として実際の印刷の色を調整する。ここで、印刷物は1枚の印刷物中に同一の絵柄が規則的に複数面に配列されている多面付け印刷物であるので、その中のある絵柄面を基準としてこの基準絵柄面と他の印刷物の各面の対応する点の測色値を比較する。基準サンプルとしては、顧客の校閲済みの校正刷り、顧客の立会いの下に実際の印刷を行い顧客の承認を得た印刷物、あるいは熟練した検査者が確認した印刷物等がある。そして、基準サンプルが定まると、それを原稿台12上に載置する。印刷物10は当て部材14、16に当接するように載置し、その後、エア吸引を開始し、原稿台12に固定させる。用紙に対する絵柄の印刷位置が一定であれば、この当て部材14、16との当接によ

り、原稿台 12 に対する印刷物の位置が決まる。

【0016】この後、基準サンプル内の基準絵柄面内の指定点の色を測定するために、指定点の座標を入力する。ここで、本発明では多面付け印刷物が対象となっているので、基準サンプルの基準絵柄面と各サンプルの各面とを比較・評価するため、基準絵柄面以外の残りの面における測定点の座標も必要である。

【0017】しかしながら、従来技術において説明したように、全部の面において同一の測定点の座標を逐一入力するのは不可能であるので、本発明では、測定点の座標は X-Y アーム 18 の座標系で表わすのではなく、各面において 4 隅のいずれか等の位置精度が高い基準点を原点とする座標系で表わすことにより、各面での測定点の入力を不要としている。すなわち、各面における同一の点（基準点）の座標と、基準面における基準点に対する測定点の相対的な座標とが分かれば、各点の測定点の座標が求められる。ここで、4 隅のいずれか等の各面の基準点の座標は逐一入力しても良いが、多面付け印刷物においては、面の配列は所定の規則に従っているため、ある面についてのみ基準点の座標を入力すれば、残りの面についての基準点の座標は面の配列の規則に従って演算により求めることもできる。なお、印刷の際の用紙のねじれの影響を考慮すると、数面について基準点を入力する方がよい。

【0018】そのため、本実施例では、図 2 に示すように、4×4 の絵柄面の配列の四隅の内の 3 つの隅、ここでは左下、右下、右上の 3 つの面 A、B、C の左下隅の角（図中、○印）を基準点として座標入力する。絵柄の隅の角の点は検査者が正しく座標入力することができ、位置精度が高い点である。さらに、本実施例では、基準面 D の基準点も入力する。なお、X 方向の配列数が 1 の場合（基準面 D と面 B、C が同一列にある場合）は、A 面の基準点は入力する必要がない。同様に、Y 方向の配列数が 1 の場合（基準面 D と面 A、B が同一行にある場合）は、C 面の基準点は入力する必要がない。このような複数の面の基準点と配列の規則から他の面の基準点の座標を知ることができる。この後、基準面 D における測定点（図中、×印）の座標を入力すれば、各面の基準点に対する相対的な測定点の座標を得ることができる。

【0019】なお、図 3 に示すような絵柄面が X、Y 方向に整列されていない多面付け印刷物の場合は、全部の面の基準点を入力することが好ましい。測定点の指定は印刷物全面にわたって複数の点を均等に指定してもよいし、特に慎重に色を合わせたい箇所（女性の肌等）に重点的に指定してもよい。測定点の指定は測色計 20 に設けられている図示しないアパーチャにある十字交差線（トンボ）の交点を測定点に合わせ、入力ボタン 26 を押すことにより行なう。これらの入力終了したら、基準サンプルの測定を行なう。すなわち、測定点の座標に応じて X-Y アーム 18 が移動し、各点の測色値が入力

される。測定値は測定点の座標とともにパーソナルコンピュータ 32 に入力される。また、基準サンプルの基準面上にボールペン 24 によって測定点が印されるとともに、モニタ 34 上に印刷物上の測定点の位置が表示される。測定点は何番目の点であるかを示す序数として表示される。なお、測色計 20 としてはハンディタイプで分光測色が可能なものを使用される。

【0020】色を数値で表わす表色系としては次のような種々のものがある。国際照明委員会（CIE）が規定した L\* a\* b\* 表色系（CIELAB 系とも称する）、L\* C\* h 表色系、ハンター L a b 表色系、XYZ（Yxy）表色系、色相（H）、明度（V）、彩度（C）からなるマンセル表色系がある。どの表色系を用いてもよいが、CIE L a b 系が人間の見た目と良く合うし、最もポピュラーであるので、ここではこれを使用する。すなわち、各指定点の L\* 値、a\* 値、b\* 値が各指定点の色彩値の標準値としてパーソナルコンピュータ 32 に入力される。CIE L a b 系では、明度を L\*、色相と彩度を示す色度を a\*、b\* で表わす。a\*、b\* は色の方向を示し、a\* は赤方向、-a\* は緑方向、b\* は黄方向、-b\* は青方向を示す。数値が大きくなるに従って色が鮮やかになり、中心になるに従ってくすんだ色になる。なお、彩度は  $(a^{*2} + b^{*2})^{1/2}$  である。

【0021】実際の印刷が開始され、安定した色の印刷物が得られるようになると、印刷物の抜き取り検査を行なう。抜き取り検査は、例えば 1000 部に 1 枚行なう。測定は原稿台に印刷物をセットし、基準サンプルの場合と同様に数面の基準点の座標を入力する。これにより、各面の基準点の座標を求め、各面の測定点の座標を求める。この後、基準サンプル測定と同様に各面の測定点を測定する。測定データはパーソナルコンピュータ 32 に入力される。各面の各測定点の色彩値と基準面の標準値との色差が所定の許容値以下であるか否かが判定され、判定結果に応じて色の評価が行なわれる。色差は次のように定義される。

【0022】

色差  $(\Delta E) = (\Delta L^{*2} + \Delta a^{*2} + \Delta b^{*2})^{1/2}$   
ここで、 $\Delta L^*$  は基準印刷物と評価対象印刷物との明度差、 $\Delta a^*$ 、 $\Delta b^*$  は基準印刷物と評価対象印刷物との色度差である。

【0023】このように測色計 20 で測定した色差を用いて色評価することにより、実際の印刷物の色がどのくらい基準の色と離れているのかが、定量的に把握できる。なお、許容値は全ての色に対して一定の値でなくてもよい。一般に、人間の目は全ての色に対して均等な感度を有するのではないので、同じ数値だけ色差が異なっても、色によって感じ方が異なる。すなわち、肌色、グレー等は僅かな色差も認識されるが、純色系の色、例えば黄色等は色差がかなり変わっても人間の目にとっては

殆ど認識されない。このため、色によって色評価の基準となる許容値を異ならせると人間の評価基準に合った判定を行なうことができる。例えば、CIE L A B空間の $L^* = 50$ の $a^* b^*$ 面上を彩度方向、色相方向に複数の領域に分割し、各領域毎に色差の許容値を決め、色が僅かに違うだけでも人間の目に違和感を感じる色（グレー、肌色等）は厳しく判定し、そうでない色（純色系）は緩く判定するように構成する。

【0024】以上説明したように、本実施例によれば、多面付け印刷物のいずれか1つの基準面において4隅のいずれか一隅等の位置精度が高い基準点の座標と評価のための測定点の座標を入力し、残りの面における基準点の座標はいくつかの面の基準点の座標と絵柄の配列規則とに基づいて求め、残りの面における測定点の座標は測定点の基準点に対する相対座標と各面の基準点の座標とに応じて求めるので、簡単な構成で多面付け印刷物において各面の同じ位置にある対応する点の印刷状態を精度良く測定することができる。

【0025】本発明は上述した実施例に限定されず、種々変形して実施可能である。例えば、上述の説明は基準サンプルの基準面と各印刷物の各面との比較評価を行なう例に関するが、各サンプル毎の基準面と残りの面との比較評価を行なう場合にも適用可能である。また、評価\*

\*は色差に基づいて行なったが、明度、彩度、色相毎に比較してもよい。印刷物の各面の基準点としては四隅の点を使用したか、絵柄面毎に余白部にトンボマークを印刷しておいて、これを基準点として使用してもよい。さらに、基準点を入力する面は隅の面に限らず、所定の任意の面でもよい。

【0026】

【発明の効果】以上説明したように本発明によれば、多面付け印刷物の各面が基準面と同じ状態に仕上がっているかを客観的に評価するために各面の対応する点の印刷状態を測定する印刷物評価装置において、簡単な構成で精度良く各面の測定点を指定することができる。

【図面の簡単な説明】

【図1】本発明による印刷物評価装置の第1実施例の構成を示すブロック図。

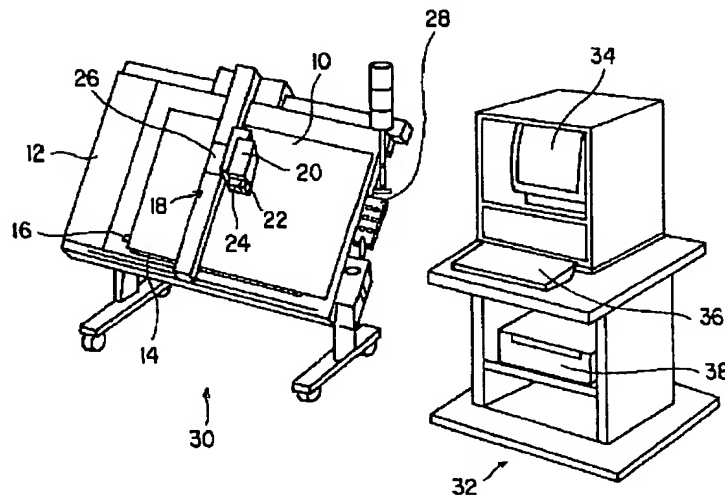
【図2】多面付け印刷物の一例を示す図。

【図3】多面付け印刷物の他の例を示す図。

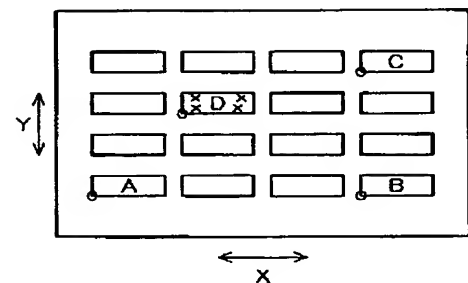
【符号の説明】

10…印刷物、12…原稿台、14、16…当て部材、18…X-Yアーム、20…測色計、24…ボールペン、26…入力ボタン、28…操作パネル、30…本体、32…パーソナルコンピュータ。

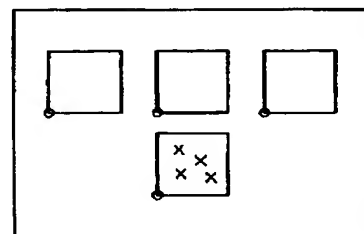
【図1】



【図2】



【図3】



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